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Reinke's Discussions of Lichenology.—IV.

BY ALBERT SCHNEIDER.

IV. OUTLINES OF A COMPARATIVE MORPHOLOGY OF THE LICHEN THALLUS.*

Numbers IV. and V. of Reinke's papers treat of the same subjects, that is the polyphylogeny, relationships and comparative morphology of the genera.

The author considers the system of Tuckerman as being the nearest approach to a natural arrangement. Reinke's system differs in that the relative position of tribes as well as of the families and genera has been modified. While Tuckerman proceeded from the higher to the lower, Reinke bases his system on the reverse arrangement. The author wishes to have it distinctly understood that the proposed system is by no means perfect; it is only an attempt at a natural arrangement of lichens based upon the very deficient data obtained from the study of the phylogenetic history of these plants.

The profuse illustrations accompanying the papers represent the morphological characters of generic types. The illustrations of sections of the thalli and apothecia are more or less semi-diagrammatic, no attempt being made to give exact anatomical details, which is rather to be regretted in a work otherwise so complete. It seems also that the author has in many instances relied wholly upon the observations of others.

V. THE NATURAL SYSTEM OF LICHENS.†

The author precedes the consideration of the arrangement of lichen groups by a lengthy theoretical discussion of the phylogenetic relationship of the groups to each other and to fungi. Much of it is a repetition of what had been stated in preceding papers. The same may be said of the general considerations of the sub-classes, families and genera.

*Reinke, J. Skizzen zu einer vergleichenden Morphologie des Flechtenthallus. *Jahrbücher für wissenschaftliche Botanik*, 28: 70-150, 359-486. 1895.

†Reinke, J. Das natürliche Flechtensystem. *Jahrbücher für wissenschaftliche Botanik*, 29: 171-236. 1896.

The following is the arrangement proposed by Reinke. The symbiotic algae and fungal affinities are deduced from a consideration of previous papers. The results plainly show that much is yet to be done in the investigation of the lichen-algae and in the study of the relationship of lichens to fungi.

LICHENES.

	Symbiotic Algae.	Approximate fungal affinities.
I. CONIOCARPI.		
(a) <i>Caliciacei.</i>		<i>Patellariacei.</i>
1. Mycocalicium.	No algae.	(<i>Protocaliciacei.</i>)
2. Calicium.	Pleurococcus.	
3. Coniocybe.	"	
(b) <i>Acoliacei.</i>		<i>Patellariacei.</i>
1. Acolium.	Pleurococcus.	(<i>Protocaliciacei.</i>)
2. Pyrgillus.	"	
3. Tylophoron.	"	
4. Tholurna.	"	
5. Acroscyphus.	"	
6. Pleurocybe.	"	
7. Sphaerophoron.	"	
II. DISCOCARPI.		
A. GRAMMOPHORI.		
(a) <i>Graphidacei.</i>		<i>Hysteriacei.</i>
1. Melaspilea.	Chroolepus.	Mycomelaspilea.
2. Arthonia.	"	Mycarthonia.
3. Lecanactis.	"	Patinella.
4. Placographa.	"	Mycoplacographa.
5. Platygrapha.	"	
6. Pachnolepia.	"	
7. Opegrapha.	"	Hysterium.
8. Graphis.	"	"
9. Glyphis.	Protococcus.	
10. Chiodecton.	Chroolepus.	
11. Schizopelte.	"	
12. Dendrographa.	"	
13. Dirina.	"	
14. Rocella.	"	
15. Combea.	"	
(b) <i>Xylographacei.</i>		<i>Hysteriacei.</i>
1. Xylographa.	Pleurococcus.	
B. LECIDIALES.		
(a) <i>Gyalectacei.</i>		<i>Patellariacei.</i>
1. Coenogonium.	Cladophora.	(<i>Stictideae.</i>)
2. Gyalecta.	{ Protococcus.	
3. Jonaspis.	{ Chroolepus.	
(b) <i>Lecideacei.</i>	Chroolepus.	<i>Patellariacei.</i>
1. Lecidea.	Pleurococcus.	Patinella.
2. Biatora.	"	
3. Bacidia.	"	Mycobacidea.
4. Thalloidima.	Protococcus.	
5. Sphaerophoropsis.	Gloeocystis.	
6. Toninia.		

7. Bombylospora.		
8. Lopadium.		
(c) <i>Umbilicariacei.</i>		<i>Patellariacei.</i>
1. Psora.	Protococcus.	
2. Umbilicaria.		
(d) <i>Cladoniacei.</i>		<i>Patellariacei.</i>
1. Icmadophila.	Protococcus.	
2. Pilophoron.	"	
3. Stereocaulon.	"	
4. Argopsis.	"	
5. Pycnothelia.	"	
6. Baeomyces.	"	
7. Cladonia.	"	
8. Glossodium.	"	
9. Thysanothecium.	"	
10. Sphyridium.	"	
11. Gymnoderma.	"	
12. Gomphillus.	"	
C. PARMELIALES.		
(a) <i>Urceolariacei.</i>		<i>Stictideae.</i>
1. Conotrema.	Chroolepus.	
2. Ascidium.	"	
3. Gyrostomum.	"	
4. Thelotrema.	"	
5. Polystroma.	Protococcus.	
6. Belonia.		
7. Urceolaria.	Protococcus.	
(b) <i>Pertusariacei.</i>		<i>Patellariacei.</i>
1. Megalospora.	Pleurococcus.	
2. Ochrolechia.	Protococcus.	
3. Pertusaria.	"	
4. Varicellaria.		
5. Phlyctis.		
(c) <i>Parmeliacei.</i>		<i>Patellariacei.</i>
1. Lecanora.	Protococcus.	
2. Parmelia.	"	
3. Cetraria.	"	
4. Dactylina.	"	
5. Evernia.	"	
6. Usnea.	"	
7. Cornicularia.	"	
8. Alectoria.	"	
9. Heterodea.	"	
10. Ramalina.	"	
(d) <i>Physciacei.</i>		<i>Patellariacei.</i>
1. Buellia.	Pleurococcus.	Karschia.
2. Rinodina.	Protococcus.	
3. Pyxine.	"	
4. Physcia.	"	
5. Anaptychia.	"	
(e) <i>Theloschistacei.</i>		<i>Patellariacei.</i>
1. Callopisma.	Protococcus.	Karschia ?
2. Candelaria.	"	
3. Placodium.	"	
4. Xanthoria.	"	
5. Theloschistes.	"	
(f) <i>Acarosporacei.</i>		
1. Biatroidium.	Pleurococcus.	
2. Acarospora.	Protococcus.	
3. Anzia.	"	
4. Thelocarpon.	"	

D. CYANOPHYLL.

(a) *Lichinacei.*

1. Calothricopsis.
2. Lichina.

Rivularia.
“

Patellariacei.
Patinella ?

(b) *Ephelacei.*

1. Thermutis.
2. Pterigiopsis.
3. Ephebe.
4. Spilonema.
5. Lichenosphaeria.

Scytonema.
Stigonema.
“
“

Patellariacei.
Patinella.

(c) *Pannariacei.*

1. Parmeliella.
2. Placynthium.
3. Polychidium.
4. Leptodendrisium.
5. Leptogidium.
6. Pannaria.
7. Heppia.
8. Heterina.
9. Coccocarpia.
10. Hydrothyria.
11. Erioderma.
12. Psoroma.
13. Lepidocollema.
14. Leprocollema.

Nostoc.
Scytonema.
“
“
“
Protococcus.
Scytonema.
“
“
“
Protococcus.
“
Nostoc.

Patellariacei.

(d) *Stictacei.*

1. Massalongia.
2. Stictina.
3. Sticta.
4. Ricasolia.

Nostoc.
“
Protococcus.
“

Patellariacei.

(e) *Peltigeracei.*

1. Peltigera.
2. Peltidea.
3. Nephromium.
4. Nephroma.
5. Solorinina.
6. Solorina.
7. Solorinella.

Protococcus.
“
Nostoc.
Protococcus.
Nostoc.
Protococcus.

Patellariacei.

(f) *Collemaeci.*

1. Lecidocollema.
2. Pyrenocollema.
3. Collema.
4. Leptogium.

Nostoc.
“
“
“

Patellariacei.

(g) *Omphalariacei.*

1. Cryptothele.
2. Pyrenopsis.
3. Synalissa.
4. Peceania.
5. Phylliscidium.
6. Paullia.
7. Omphalaria.
8. Anema.
9. Psorotichia.
10. Euchylium.
11. Collemopsidium.
12. Pyrenopsidium.
13. Phylliscum.

Gloeocapsa.
“
“
Chroococcus.
Gloeocapsa.
Chroococcus.
“
Chroococcus.

Patellariacei.

III. PYRENOCARPI.

(a) *Verrucariacei.*

1. Verrucaria.
2. Strigula.

Chroolepus.
“

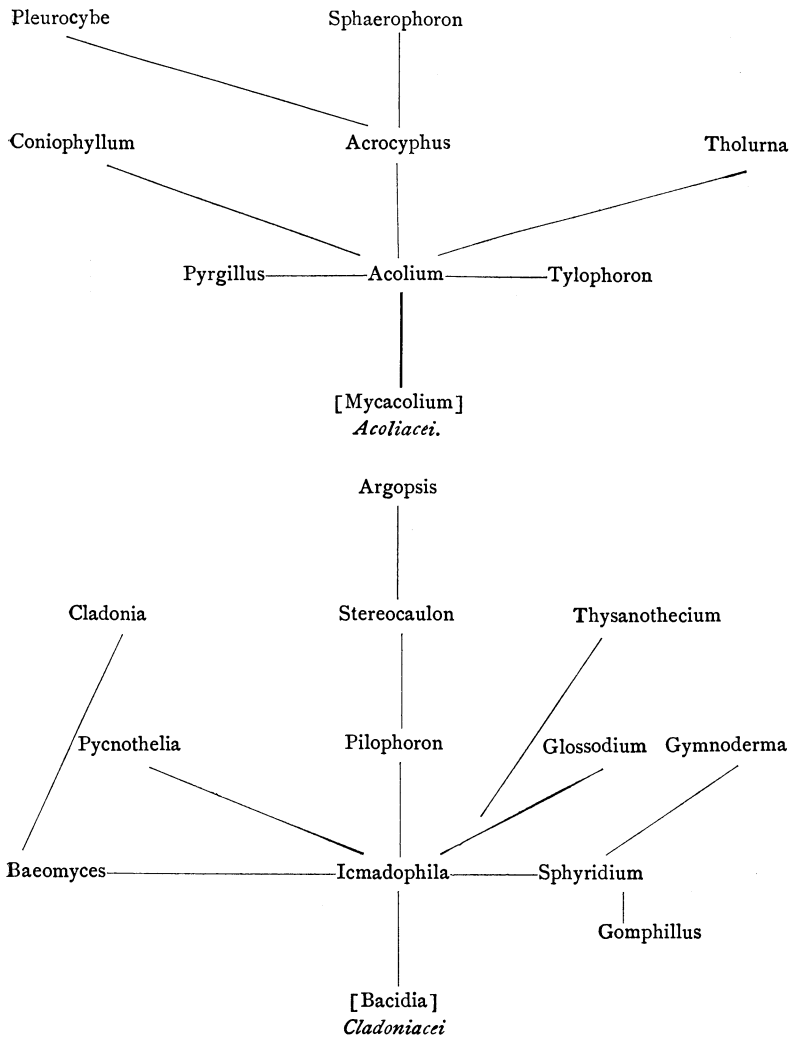
Sphaeriaceae.

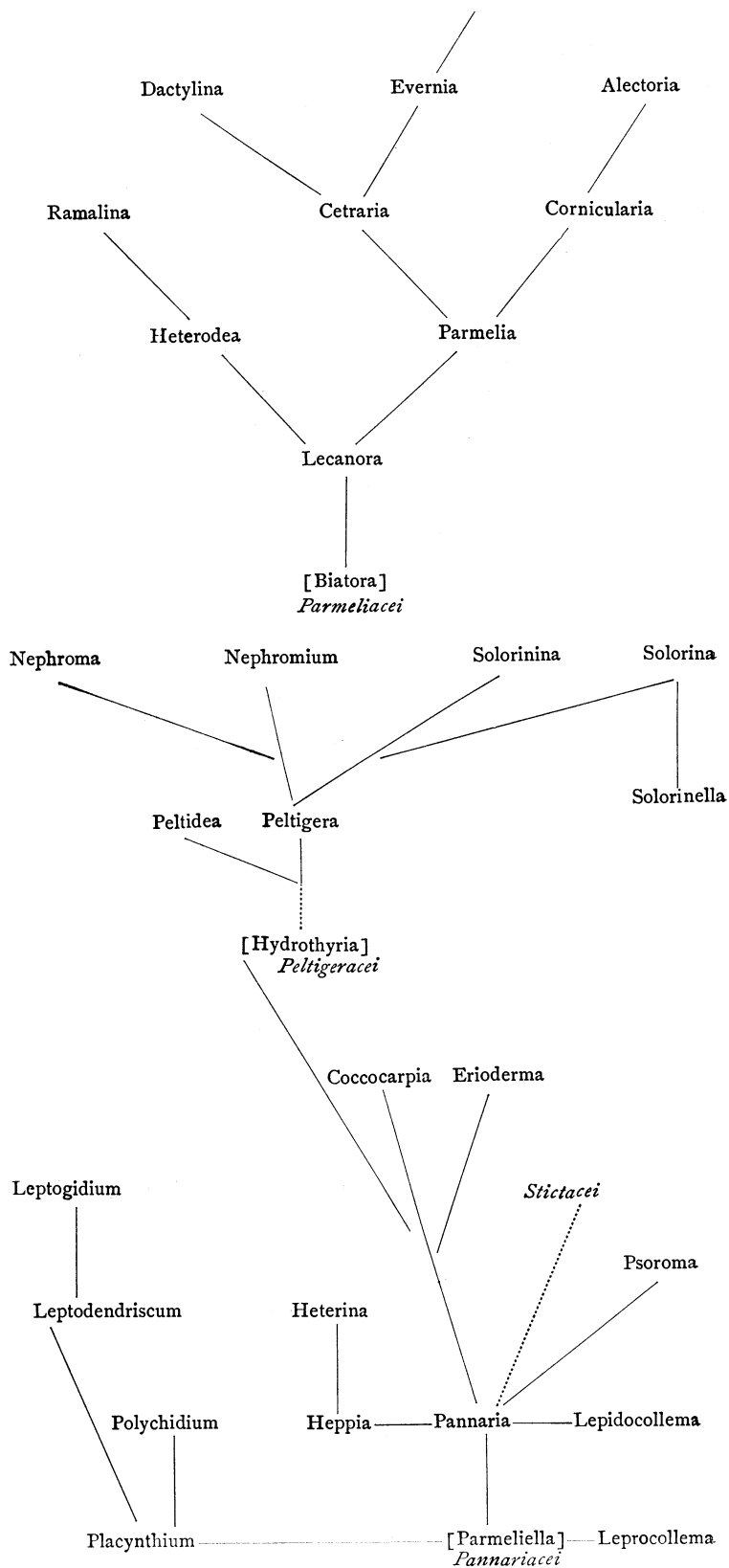
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|-------------------|-------------|
| 3. Endopyrenium. | Chroolepus. |
| 4. Endocarpon. | " |
| 5. Pyrenothamnia. | " |

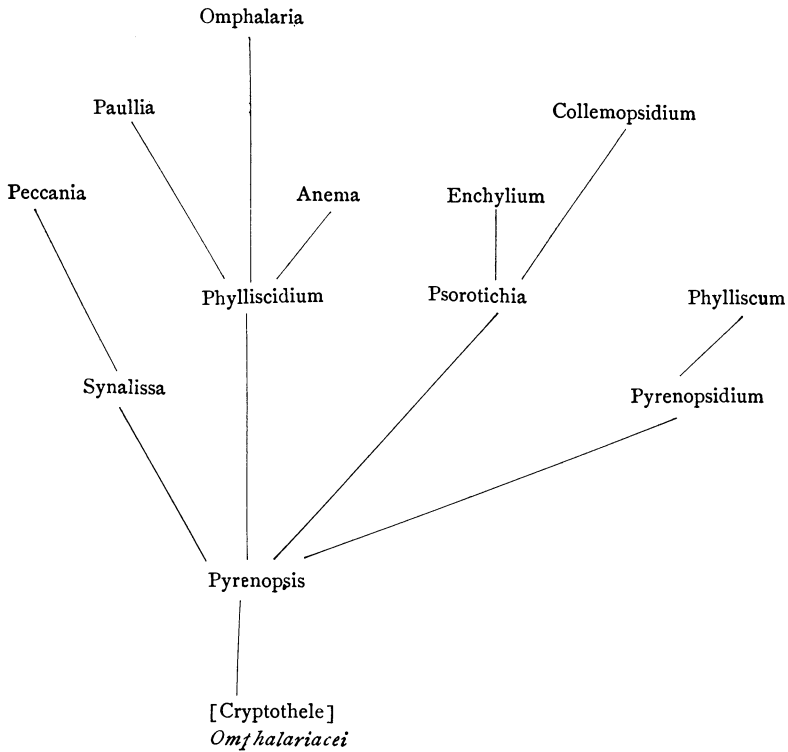
LICHENES IMPERFECTI.

- | | |
|------------------|--------------|
| 1. Thamnomia. | Protococcus. |
| 2. Siphula, etc. | |

The following diagrams show the probable phylogenetic relationships of the genera of some of the families. The remaining families are not sufficiently well understood to indicate this relationship.







Rarieties from Montana.—II.

By P. A. RYDBERG.

(Plates 304–307.)

POLYGONUM AUSTINAE Greene, Bull. Cal. Acad. 2: 212. 1885.*

This little interesting *Polygonum* was collected on the side of one of the highest peaks of the Crazy Mountains, September 8, 1896, at an altitude of 8000 feet.

POLYGONUM ENGELMANNII Greene, Bull. Cal. Acad. 1: 126. 1884.

This has hitherto only been collected in the higher mountains of Colorado. It is not uncommon in central Montana at an altitude of 6000 feet or more. Cottonwood Creek, July 30, 1896,

* This and the next have been determined by J. K. Small.